# SCIENCE NEWS-LETTER

*The Weekly Summary of Current Science*

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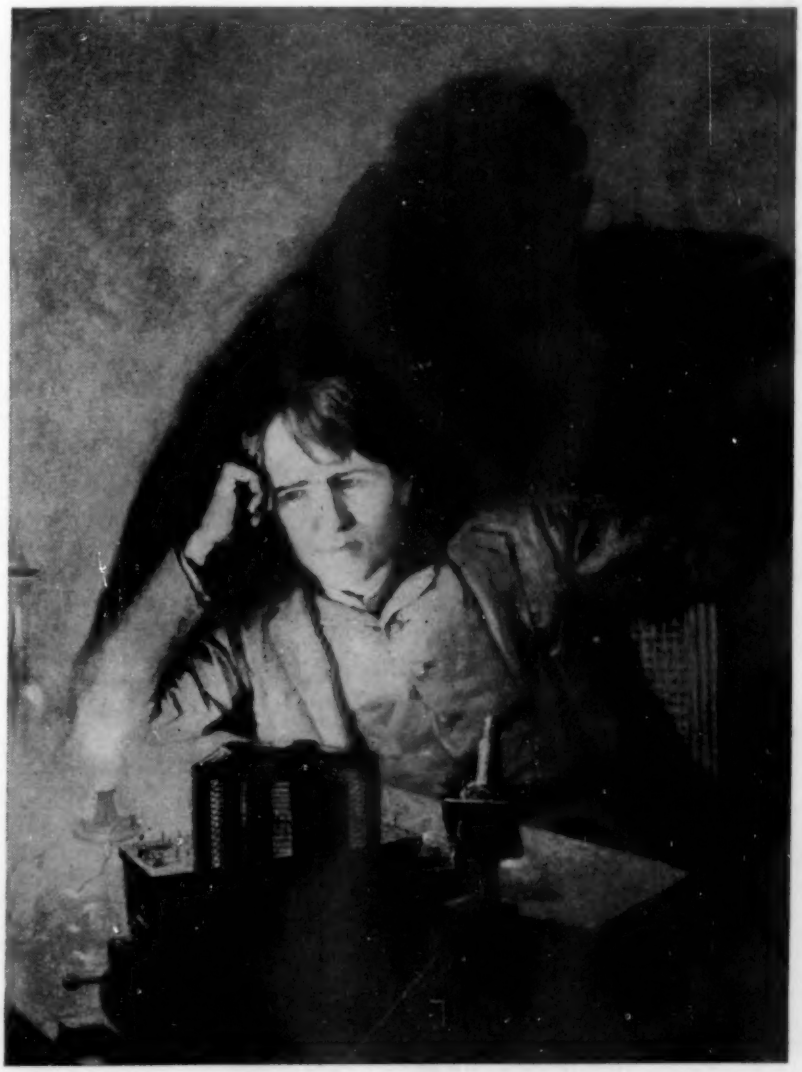

## FIFTY YEARS AGO

*The Dawn of More Light for Mankind*

(*See page* 90)

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# Money Sacred to Indians

*Ethnology*

Wampum, the money of the Indians of the Atlantic States, such as the Delawares, was not the "filthy lucre" of civilized man, but a sacred thing. In fact, all transfer of property from one Indian to another, was really a gift. The passage of wampum to the donor was not in the nature of payment for value received, but as a charm to protect from any evil influence that might be transferred with the gift and make itself manifest as illness in the recipient. This has been found out by Dr. Frank G. Speck, professor of anthropology at the University of Pennsylvania, and a leading authority on American Indians of the East.

"In the exchange of vendable property, even extending to gifts between friends," said Dr. Speck, "there lurked a potency for evil that might develop in who knows what quarter, producing malice or resentment among the parties concerned. It could even result in bodily poison to one or both. It is strictly correct to state that in the attitude of the eastern Indians toward such affairs, the passage of shell money, or wampum as they called it, from the hands of the receiver of a gift or purchase to those of the giver performed the function of medicine. The wampum protected them against spiritual infection and its manifestation in the body in the form of sickness. Wampum was a purifier, purging the transaction from latent evil force. And should evil have leaked through the transaction the wampum would function as a purgative for its keeper. The same wampum was a spiritual emblem believed by them to have come originally from supernatural sources and embodying within it profound supernatural dynamics.

"We can understand why a compact sealed with the transfer of wampum was as sacred as one sworn on an oath by the Bible, the Koran or the beard of Abraham. It was such an attitude toward exchange and currency that our colonial forebears encountered when they bartered for land and peltry with the aborigines of New England and the Middle Atlantic States. The colonists handed out their exchange with the European notion of intrinsic value, receiving the return with the native idea of spiritual and supernatural interplay.

"The Dutch in buying Manhattan for 60 guilders of trinkets undoubtedly drove a shrewd bargain with the Delawares. But who has told us that in the eyes of these same Delawares the currency was the symbol, not the value equivalent, of their relinquishment of their exclusive hereditary rights to the land as well as its products?"

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## More Light!

*Invention*

Last Monday, February 11, Thomas Alva Edison celebrated his eighty-second birthday. The entire country heard his voice on that occasion over the radio. But when the scene shown on our cover took place he was just approaching fame. A few of his inventions had been given to the world, others remained in the future. Then he was at work on the problem of producing an electric light for the home, that would have none of the disadvantages of the arc light.

The story of the dramatic events at Menlo Park, N. J., on October 21, 1879, have often been told—how the bulb of the lamp was pumped for many hours to exhaust the air, how he had the glass-blower seal off the bulb from the pump, how it was mounted on a wooden base and the current started through it. A brilliant glow came. But would it last? Already other lamps had been made and had started off just as brilliantly, only to burn out too soon. Edison watched. The cover painting, made for the General Electric Company by H. H. Mott-Smith, shows this vigil, the "death watch" as his assistants called it. For hour after hour the lamp glowed, with Edison calmly and patiently sitting by. Forty hours elapsed before the lamp burned out. At last a successful lamp had been produced and the electric lighting industry, that affects everyone so vitally, had been born.

*Science News-Letter, February 16, 1929*

## *In This Issue—*



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# Primitive Races Survive in African Desert

*Anthropology*

By Emily C. Davis

If you were transported to a desert in South Africa—one of the least known corners of the world—and there in the wilderness you met women of a Bushman tribe wearing tall, three-pronged helmets in the famous Viking style, you would probably think you were dreaming and your mental wires had got badly crossed.

If other types of Bushmen were there, with slant eyes and the yellow skins of Orientals and with Chinese tones to their African speech, you would be still more perplexed. And if still different types of Bushmen appeared with reddish skins reminiscent of the American Indian, you would probably sum up the whole baffling situation in the words of Alice in Wonderland—curiouser and curiouser.

These strange, almost unbelievable combinations have been seen and accounted for, however, by an English professor who has had a rare opportunity to journey straight through the Kalahari Desert. The evidence he obtained there appears to upset many prevailing ideas about primitive men in general and about the African Bushmen in particular. His explanation of what he saw links these primitive natives hidden away in South Africa with the distant civilization of Egypt, Crete, Greece, even Scandinavia and China.

The professor, E. H. L. Schwarz, is a geologist and geographer. For more than thirty years he has lived in South Africa, making field surveys of its uncharted country and teaching at the Rhodes University College, at Grahamstown, S. A.

The Kalahari, a great forbidding wilderness in the heart of South Africa, he describes as the last place on earth—outside of the polar regions—where men would want to live. That is why, for many centuries, tribes of primitive men have found the Kalahari a refuge where they could be comparatively safe from their aggressive fellow human beings. And that is why the world has known so little about them.

In the vast tracts of unknown land, Professor Schwarz states, some 10,000 of these people live by the chase, using stone tools as our ancestors did in Europe thousands of years ago, speaking a language invented before the human tongue learned the trick of articulative speech, and showing

*VIKING HELMETS in South Africa. This is more than a coincidence, Prof. Schwarz believes*

relationship to all the more important stocks of the early human race.

It is as if time and progress had stood still in this enclosed and isolated region, and here we can see in some way what manner of folk we have sprung from.

All through the geologist's journey he saw only these wandering people of the wilderness. Some of the types had never before been described or photographed. The name of Bushman has usually been reserved for the whity-brown pigmies of the bush country. Other types of natives found by the few adventurers into the region have as a rule been thought of as mixed breeds or intruders into the Bushman's home land. But the geologist reports that there are ten or twelve different types of Bushmen. Some have yellow skins, like the Malay; others brighter yellow like the Chinese. Some are red-skins, and others are black. There are pigmy-sized Bushmen, and middle-sized Bushmen, and some that are more than six feet tall. And while there are many mixtures of race, there are enough pronounced pure types so that they can be sorted out into separate peoples and their origins traced.

The different groups got their strange customs and their physical heritage for the most part in the Mediterranean region, 3,000 miles away, according to Prof. Schwarz's theory.

Take the best-known Bushman, for example, the pigmy type, whose body color, when it can be seen through the dirt, is a corpse-like whity-brown. It is reasonably certain that these Bushmen lived originally on the shores of the Mediterranean, Prof. Schwarz points out. One kind of evidence is the pictures of Bushmen shooting ostriches that have been found on the walls of rock shelters in the Sudan, in North Africa. Similar pictures have also been found in Rhodesia, not far from the Kalahari.

"These Bushmen introduced gaiety into the world," says Professor Schwarz. "Most of the early races were horribly devil-ridden, and life was no joke except to the very few who were rulers. But the Bushmen are always laughing and dancing, and centuries of the bitterest oppression have not taken this saving grace from them.

"These Bushmen were probably the world's first court jesters, for they were brought to the Egyptian court on account of their amusing antics from the time of the first dynasty some 6,000 years ago. When the Pharaoh died his Bushman was killed and buried in the same grave.

"The idea was that when the spirit of the king came into the kingdom of the great god Osiris, the god would think him a great sinner if he had a long face. But if he came accompanied by the shade of the dancing Bushman the god's attention would be diverted and he would pass the party on to the regions of bliss.

"Later the awful thought struck the priests that perhaps Osiris would let the Bushman pass and detain the king, so Pharaoh had to learn to tread the Bushman measures himself. The idea of a king on his throne solemnly studying the steps of a Bushman dance with the object of executing a similar performance before the highest god of the Egyptians is very delightful; more so, as one can still see the dwarfs performing the identical dance."

When the Trek Boers came into South Africa they killed off 2,700 pigmy Bushmen in ten years. But the few that remain still dance and laugh and play the buffoon generally.

An earlier entrant into the Kalahari was the yellow Bushman, known as the Masarwa, the explorer reports. This Bushman is a fairly tall, sturdily built type. People with the same characteristics are found today in such scattered places as Australia and Patagonia, he goes on to explain. There was a prehistoric race around the Mediterranean called the Mousterian race, whose remains occur from Gibraltar to Galilee, which was similar to these yellow Bushmen, if not quite identical. He concludes that there is sufficient evidence (*Turn to next page*)

# Primitive Races Survive in African Desert—*Continued*

*DRY STICKS ARE ALL THAT IS LEFT of the South African forest when drought claims it*

to found a working theory that these prehistoric people spread all through Africa and Asia and became the races that we now find at the far ends of the continents. If this proves acceptable, these yellow Bushmen would be living specimens showing what the yellow races generally have sprung from.

"An almost parallel case is afforded by the red Bushman, the Qung," Professor Schwarz finds. "These are mostly small people whose skin is colored a deep, even red. Now these certainly did live around the Mediterranean in very old times, for we find men and women depicted in ancient frescoes on the island of Crete shown with precisely the same body color, and the same thing occurs in Etruscan frescoes in Italy. The same color occurs among the lower coolie classes in China."

Then there are the Hereros, a Bushman tribe whose women wear tall, three-winged helmets made of leather and ornamented with iron beads. The helmet looks decidedly Viking, and in the museum at Christiania there is preserved a Viking helmet with three wings of the same kind.

The explorer explains the distant spreading of this fashion idea by suggesting that it arose in North Africa and was carried by the bargarians to Greece, through Russia and on to the Baltic. Meanwhile, the same custom in its original form was taken southward by the people who migrated that way.

There is additional support for this theory that the Viking helmet styles spread north and south from the African shore of the Mediterranean in the fact that South Africans also wear another kind of typical Viking headdress. This African tribe takes the skin of the hump of a cow, which makes a convenient cap, and attaches on either side the tusks of a hippopotamus. This is the other form of Viking helmet, and the scientist concludes that "it seems incredible that both kinds of early Norse headgear should be found in Africa unless there had been a direct connection."

The women who wear the warlike helmets admire a feminine adornment —long hair. This cannot be attained naturally, but under the leather headdress they fasten strands of cow hair to resemble luxuriant plaited locks. Among some neighboring tribes this fashion calls for "hair" hanging down to the heels, and with others thick plaits are the thing. All pretend that the hair is genuine.

Another Bushman tribe is literally a Chinese puzzle. These are brighter yellow in color than the Masarwa, and are a type of Hottentot. Their faces are strikingly Chinese. But what are Chinese doing in South Africa?

Professor Schwarz came into close association with some of these incongruous natives, and after studying their faces he concluded that the typical eye is purely oriental.

"There is a fold of skin dropping vertically on the inner margin," he says, "while the conjunctiva or third eyelid is abnormally developed forming a scarlet clot in the inner angle. This is a Mongolian feature and occurs in no other race, and to my mind indicates admixture with Chinese blood, a view which is strengthened by the guinea-gold color of the skin.

"The tones and pitch in which these people pronounce words may give them a special meaning. In Chinese there are four tones to the more polished dialect of the north, but in the south these rise to sixteen. It is more than a coincidence that the Hottentot language should possess many of the actual tones of the Chinese language. It is inconceivable that a poor nation such as the Hottentots should have elaborated by themselves such a complicated system of word sounds.

"The whole of this study points to direct Chinese influence, such as might have been brought about by the wreck of Chinese ships along the west coast. Some of the larger ships from China that sailed in the region of Africa, according to old accounts, carried as many as 1,000 people. Ship-wrecked mariners of the middle ages, it would seem, married with the Masarwa or other Bushmen who were unable to impart their language. So the children grew up using the words of their mothers, but keeping the intonation of the fathers."

Only about 40 pure-bred Hottentots of this kind are still left, though many half-breeds occur throughout Southwest Africa, the explorer states. In fact, the various tribes of the Kalahari are on the verge of extinction. Up until 500 years ago their country was a well-watered jungle, stocked with plenty of antelope, rhinoceros and other game which the hunters could depend on for food. Then the great Victoria Falls broke through, and much of the water that had swept down the center of the Kalahari was diverted off to the sea. Gradually the bush began to become desert.

Even 75 years ago the region supported great herds of wild beasts. But since then the desert dryness has spread out in barren, widening circles, claiming more of the tropical growth and shriveling the rivers so that they can no longer be used as water-highways. It is only when a great record-breaking flood comes into South Africa that an adventurous explorer like Professor Schwarz can make his way by boat into the depths of the South African Sahara.

At the time he crossed the Kalahari conditions of 100 years ago were almost miraculously restored. Streams that had been dry sand beds were running swiftly again and the geologist with native guides and a native boat traveled 550 (*Turn to page* 97)

# New Value of Electron

*Physics*

Hailed by mathematical physicists as ranking in importance with the newly published Einstein paper, Dr. A. S. Eddington, Plumian Professor of Astronomy at Cambridge University, has just announced to the Royal Society here the results of research upon the charge of the electron.

Basing his work both on the theory of relativity and the quantum theory of light, Professor Eddington has found a formula which enables the charge of electricity in the electron, the electrical "atom" and building stone of which atoms are made, to be calculated from two other values. He proves that the value should be a whole number. As a result of these purely theoretical considerations, the famous Nobel prize experiment of Dr. R. A. Millikan, physicist of the California Institute of Technology, in determining this value, may be proved to be slightly in error.

According to the most recent form of the quantum theory, which supposes that light travels as separate bursts of energy rather than as a continuous emission, the electrons are not tiny particles. They either consist of, or are associated with, waves, in some peculiar manner. About this concept has grown the branch of physics known as "wave mechanics".

The two figures that Professor Eddington has used in computing the electric charge of the electron are the speed of light, which has been determined with extreme precision by Dr. A. A. Michelson of the University of Chicago, and what is known as Planck's quantum constant. The physicist represents it by the letter *h*. Light and other forms of radiation, like radio waves, differ in frequency, or the number of vibrations per second. The faster the vibration, the more energy there is in a single quantum, or "bunch," of the radiation. This energy is equal to the frequency multiplied by the quantum constant, which is named after Max Planck, the originator of the theory. The numerical value of *h* is 6.55.

Professor Eddington pointed out that it has long been known that a formula for calculating the electron's charge from the velocity of light and the quantum theory must exist, but this is the first time that it has been found. According to the results of his reasoning, the charge is a whole number, 136. In his famous experimental determination of the same value, Dr. Millikan obtained the value 137.1. Although this is less than one per cent. greater, the difference is too much for scientists to be entirely satisfied.

"I must hope that in this case theory has succeeded in beating experiment," said Professor Eddington in an explanatory statement to Science Service, "and that newer experimental determinations will confirm my value. If this theoretical value should prove right in the end, that does not, of course, disparage the brilliant experimental work which has given a value at any rate close to the truth."

That his hopes may be justified is indicated by a very recent measurement of the experimental value by Dr. K. M. G. Siegbahn, a famous Swedish physicist, and that is very close to 136. Professor Eddington's work is based largely on what is known as the "exclusion theory", which was developed largely by Dr. P. A. M. Dirac, another English physicist, but which has never been explained in non-mathematical language.

"My result is a suggested mathematical theory, which, if it can be accepted, will form one step in the development of the subject," said Professor Eddington. "Our ideas about the quantum theory will need to become much clearer before physicists generally (including myself), are quite satisfied about it. But that applies to much modern progress in quantum theory. We are working very much in the dark and the most one can say about any suggested step forward, such as this, is that it looks a bit hopeful."

*Science News-Letter, February 16, 1929*

# Inauguration Movies to go "On the Air"

*Television*

Television experimenters throughout the country will be able to see on the evening of March 4 motion pictures of Mr. Hoover's inauguration. C. Francis Jenkins is now arranging this historic radiovision broadcast. Even long before airplanes carry the films to theaters a re-creation of the inaugural ceremonies will be sent through space via radio waves.

A new radiovision broadcasting station, using a short wave and 5,000 watts power, will be in operation near Washington by March 4, unless unforeseen delays occur, Mr. Jenkins told Science Service. When this is in use, Mr. Jenkins plans to broadcast radiomovies every night, instead of three nights a week as at present. As the new station will have a band a hundred kilocycles wide, it will be possible to broadcast motion pictures in half-tones, instead of only as silhouettes as at present.

The short time available will probably make it impossible to broadcast actual television images from the inauguration itself, Mr. Jenkins explained. Motion pictures of the ceremonies will be made especially for the purpose, and rushed through the finishing laboratory so as to have prints ready a few hours after Mr. Hoover becomes president. These films will then be shown with the radiomovie transmitter at the Jenkins laboratory on Connecticut Avenue, from which they will be transmitted to the station, in a Washington suburb, by telephone line. This telephone connection will be similar to that now used by many sound broadcasting stations.

*Science News-Letter, February 16, 1929*

# "Decibel" Latest Unit

*Telephony*

When telephone engineers get together in the future to talk about problems of transmission, the word "decibel" will figure largely in their conversation. That is the name that has just been adopted by the engineering staff of the Bell System to designate what has previously been known as the "transmission unit." It refers to the efficiency of telephone circuits. The new name was adopted after a conference between the representatives of the Bell System and the International Advisory Committee on Long Distance Telephony in Europe. The actual unit decided on was the "bel," named after Dr. Alexander Graham Bell, inventor of the telephone. The bel, however, is larger than is needed in practice, so the unit one-tenth as large, and therefore called the decibel, has been adopted by the engineers.

*Science News-Letter, February 16, 1929*

# The Values of Science

*General Science*

WILLIAM KAY WALLACE, in *The Scientific World View* (Macmillan):

As far as is now known only once before in recorded history do we find what we may term an age of science. In Greece from the fifth to the second century B. C. science flourished. It influenced and determined social precepts though it never manifested itself to any marked extent in practical affairs. To the Greeks science was in no way bound up with a desire for life as we find it today. Though a scientific approach to the problems of existence and to a good life led them to discover many profound empirical truths, no technique was ever devised to exploit these truths or to turn them to practical account.

Like primitive religion, which is unethical, primitive science in its Hellenic interpretation, though it was able to bridge the gap between ethics and science, was never able or inclined to cross it. The causes for this are not far to seek. If our hypothesis is correct, that a given cultural level and its attendant moral code rest upon the economic system in force, it will be seen that the economy of Greece during this first scientific period rested on the foundations of a relatively primitive slave economy. The routine of Hellenic life was restricted to the productive capacity of this economy.

It was thus possible for the Greeks to describe the stars in their courses with no little scientific insight, but they never bethought themselves that telescopes were needed to confirm their hypotheses. Hippocrates might outline scientific ideas about disease, but it never occurred to the Greeks to devise scientific methods of treatment, as the economy of the age did not offer the necessary technical facilities. Aristotle could teach a doctrine of evolution, but it was not until more than twenty-two centuries later that it first occurred to the scientists of our own times to establish the validity of the theory of evolution by recourse to a scientific observation of facts.

The science known to the Hellenic world was in its technical aspects primitive in the extreme, intimately related to the stage of development of economic life. But there prevailed that sense of intellectual freedom which is a first requisite of scientific speculation, and without which science cannot live. The most important and lasting contribution of this first age of science was a group of theoretical moral sciences which, though destined to make way for the rise of religious morality, was never wholly lost sight of. The intellectual freedom which the Greeks enjoyed was displaced by the rigid mental discipline of Christianity which precluded any and every effort of the human spirit to find its way in the world of nature. Nevertheless, before the close of the Middle Ages we may see evidence of a reawakening of the faith in science to explain natural phenomena satisfactorily. . . .

Modern science is in a sense an outgrowth of the Hellenic scientific world view. Yet it is a mistake to seek to link it too closely with this past. Descartes at the beginning of the scientific age instinctively felt this. His effort to break with the past, not merely with the mediaeval, but also with the Aristotelian tradition, shows that modern science had a different purpose in view from that of the preceding scientific era.

Science in Modern Times, whatever its antecedents may be, whatever its limitations and inadequacy, is now recognized as the great impulsive agency in the development of the best life. When during the 19th century the doubts as to the validity of the scientific world view were being removed, the thoughts of men that had grown stereotyped and conventionalized were freed from the last vestiges of religious bondage and were in a position to investigate not only the material universe but mind itself.

Science is creating a new scale of values. We find in the first instance an intimate relationship between the application of scientific methods to the means of production and the ubiquitous spread of science during the past half century. In other words, the economy of the new age, which is grounded on a scientific hypothesis and makes it possible to bring accurate evidence to bear in proof of the claims of science, is in turn enriched by the fruits of scientific research in the realm of ascertainable facts. We have thus established a co-ordination of purpose that, while enhancing the value of science, in social life makes for continuous improvement in the methods and means of industry to satisfy, by the creation of an adequate technical equipment, the exacting demands of science. *Science News-Letter, February 16, 1929*

# Weather Science as College Course

*Meteorology*

The scientific study of the weather, meteorology, should be offered as a well-developed college course. There should be three different types of instruction, one of the highly technical nature demanded by candidates for professional work in meterology, one less technical but still highly practical, designed for agricultural students, and finally a purely cultural course for persons who would not expect to make practical use of it but would study the weather as they now study botany or geology, just for the satisfaction of knowing about it.

This is the program advocated by Dr. W. J. Humphreys, physicist of the U. S. Weather Bureau. The courses in meteorology offered in many of the universities and colleges at the present time, he says, are quite inadequate, being taught, as a rule, as a side-line in the geology department by a professor who is not trained as a professional meteorologist. They are, however, frequently misnamed, being called meteorology when they should be called climatology, which is the study of "past weather".

"Meteorology, on the other hand, treats of the weather of the very present, especially why it is, what it is, and from that in turn deduces what it next must become," Dr. Humphreys says. "Climatology integrates the past and infers the general average for years to come. Meteorology analyzes the present and deduces the exact state of the future, but as yet in terms only of hours to come, or days (*Turn to next page*)

## Rubber Work Curtailed

*Economics*

Much of the experimental rubber work previously planned and started by the U. S. Department of Agriculture will have to be abandoned and curtailed during the next fiscal year, due to a decrease in appropriations in the bill now before the U. S. House of Representatives.

The chief curtailment will occur in the work in the tropical and sub-tropical possessions of the United States, such as Panama and the Philippines. Experiments with the guayule plant in the Salinas Valley of California are to be continued.

Regarding these experiments, Dr. William A. Taylor, chief of the Bureau of Plant Industry, said before the House Committee on Appropriations: "It is in small acreage yet, and the ultimate method of producing it under cultivation can not yet be said to be perfect. It is a four-year crop, practically, from planting to harvest."

The entire guayule plant is used in making this type of rubber, he said, and therefore its production is a very different undertaking from the hevea-rubber production, where the trees are tapped and the exuding milk is collected.

Hevea rubber trees planted in Florida, Dr. Taylor said, were doing very well, but were not old enough yet to tap.

Rubber production in the Philippines, he declared, is not yet beyond the experimental stage, despite the fact that there were a few plantations there. He (*Turn to next page*)

## Buildings Have Diseases

*Bacteriology*

Buildings die of germ diseases just as people do. The decay of stone castles, cathedrals and monuments is not due to the solvent action of gases in the air, reinforced by fumes from coal smoke and chemical works. Dr. R. M. Buchanan, a London botanist, reported that he has found bacilli, yeasts and moulds infecting decaying stone surfaces. Their prevalence in regions remote from smoke justifies a definite disease name, and Dr. Buchanan proposes "Lupus lapidis", which Englishes into "stone consumption". The germs of stone decay have been artificially cultured by their discoverer, and he finds that each type of decay is characterized by a definite germ flora, just as each human, animal or plant disease has its own special causative organism.



## Island Yields Phosphate

*Chemistry*

Phosphate cargoes bulking over a quarter of a million tons a year are now being shipped from Nauru, a small island only 26 miles south of the equator, whose resources are being exploited by Australians. The phosphate is marketed in Australia, New Zealand and Japan.

Some thousands of Kanaka and Chinese laborers are employed in the workings, their labor supervised by a force of 100 to 120 Europeans. The latter are recruited mainly in Australia. They "take on" for a two-year "hitch."



## Nature Ramblings

By Frank Thone

*Natural History*

*Titmouse*

"On the bank of a river a little tomtit
Sang 'willow-tit-willow-tit-willow' . . ."

Why Gilbert should have made out the cheerful little titmouse as the singer of a lugubrious song is hard to figure out. Gilbert was a cheerful person, and he should have given fraternal credit to another cheerful person. To be sure, it is highly probable that the little bird would frequently have "a rather tough worm in his little inside", but this is something he would be used to, for he is a great destroyer of wire-worms, caterpillars and other insect larvae in the summer, and of insect eggs and pupae in the winter.

The crested titmouse is a rather common bird throughout most of the United States east of the Rocky Mountains, frequenting winter thickets along stream courses, but is very apt to be overlooked because of his inconspicuous coloring and retiring habits. He is gray all over his upper parts and white underneath, except for a small area of brighter feathers back of his legs, so that he blends very well with gray trees and sky and white, snow-covered ground. His one mark of gayety in attire is his conspicuous crest; and his wife is crested also.

He does not sing "tit-willow", but "pe-to", repeating the notes about five times; this has earned him the name "Peter-bird" in some localities. Like his cousin the chickadee, he also has a call note, "de-de-de-de", which he uses when he wants more immediate attention. He resembles the chickadee also in his liking for acrobatic stunts, swinging about on twigs in all sorts of upside-down attitudes, as he spies about for insect eggs.

## We Grumble at Detours—

*Economics*

LEON C. MARSHALL in *The Story of Human Progress* (Macmillan):

In the early colonial days wheeled vehicles were unknown. They had been rare in the mother country, England. They were useless in the new country, where the only roads were narrow Indian trails, and from 1650 on colony after colony made provision for roads on which wheeled vehicles began to appear. But these colonial roads were not like those of today. "Road making" often meant merely clearing out fallen timber, blazing or notching trees so that one would not lose the road, throwing logs into marshy places, and cutting stumps so that they did not stick up too far. There were few or no bridges, and the fords were dangerous.

The early American road was a frightful thing. Watery pits were encountered wherein horses were drowned and loads sank from sight. The first postrider's trip between New York and Boston (made in 1673) took three weeks. We cover that distance today in less than two hours by airplane. As late as 1766 it took two days for a passenger coach to go from New York to Philadelphia. It now takes two hours by train. It was not until 1782 that coach service was installed between Boston and New York, and the trip took six days. In 1796 it was said of the road from Philadelphia to Baltimore, "chasms to the depth of six, eight, or ten feet occur at numerous intervals. Coaches are overturned, passengers killed, and horses destroyed by the overwork put upon them." Before 1800, the turnpike, a road surfaced with fine stone, was rare on the Atlantic seaboard and, of course, quite unknown elsewhere.

*Science News-Letter, February 16, 1929*

## Weather Science in College—*Continued*

at most. Meteorology, then, as a science, is the physics of the air, and as such draws from every major branch of general physics, and from some of them very heavily. It cannot be profitably studied at college without at least a working knowledge of that basic subject and a corresponding preparation in mathematics. Whoever, therefore, presumes to teach it should have a very wide and intimate knowledge of physics, with all the mathematical training such knowledge implies. Even then, he will be confronted daily, if wide awake, with problems that he will be unable to solve.

"This recognition of the difficulties of the subject is not offered as a deterrent to those who might wish to study it, but as a warning that adequate preparation is an essential to the successful study of meteorology as it is to the mastery of anything else. It is hoped, too, that it may make clear the fact that meteorology in its every phase is physics pure or applied, and, therefore, in educational institutions should be either classed independently or else assigned to an important place in the Department of Physics. To allocate it to any other department would be to foredoom it to failure so far as any useful results are concerned, unless indeed that department had on its staff, for this work, a really competent physicist trained in a knowledge of the air and its ways."

*Science News-Letter, February 16, 1929*

## Overgrown Brain

*Anatomy*

MORLEY ROBERTS in *Malignancy and Evolution* (London), quoted in *Emergent Evolution and the Development of Societies* (*Norton*):

In discussing the factors of evolution objections to our regarding the encroachments of the fore-brain upon the animal function of the human body as perpetual approximations to and recessions from a state of morbid overgrowth, on the ground that to this we owe human progress, are wholly irrelevant. Progress, whatever it may be, is obviously relative and a healthy Neanderthal or Cromagnon man, who might as easily dispose of a modern athlete as any gorilla, could be held excused if he thought his bald and almost jawless successor to be in the highest degree degenerate. There can be no doubt that what we, perhaps in our blindness, call the upward progression of the human race, has always been accompanied, especially when advance seemed most rapid, by an increase in disease, and it would in no way be surprising if we learnt at last that the remarkable increase in the fore-brain was not only one of the causes of malignancy but was to be in the end one great cause of the extinction of man. If that proved to be a fact, such a result would but class man as one of the many races of animals which perished of special overgrowths and a possible lack of fertility.

*Science News-Letter, February 16, 1929*

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Experiments by Japanese scientists indicate that Japanese children given less rice and a more varied diet than is usual in that country tend to become taller and heavier.

## Rubber Work—*Cont'd*

made this statement, he said, having in mind the competition with the older established producing territory of the Straits Settlements and the Dutch East Indies.

Rubber trees will grow in the Philippines all right, but "the way to do it has not yet worked sufficiently to convince the people who have the capital that there is a good chance for them there. Of course, there is this other feature, too, which is a limiting factor, namely, the size of unit which the Philippine land laws permit any single operator to control."

This maximum unit, it was explained, is 2,500 acres. Large corporations will not limit themselves to 2,500-acre plantations.

American tire companies, Dr. Taylor said, have plantations in Sumatra and Java. Firestone has one in Liberia and Ford one in Brazil.

*Science News-Letter, February 16, 1929*

## Extinction of Pure Reason

*Evolution*

SIR ARTHUR KEITH in *Darwinism and What It Implies, quoted* from *Nature,* January 19, 1929:

The day man becomes a perfectly rational being marks his end.

To extinguish the spirit of competition is to seek for racial suicide.

*Science News-Letter, February 16, 1929*

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A jackrabbit can run 35 miles an hour, a government scientist found, when one raced ahead of his automobile.

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Use of electric power in the 16 southern states is increasing more rapidly than in the rest of the country.

# Primitive Races Survive in African Desert—*Continued*

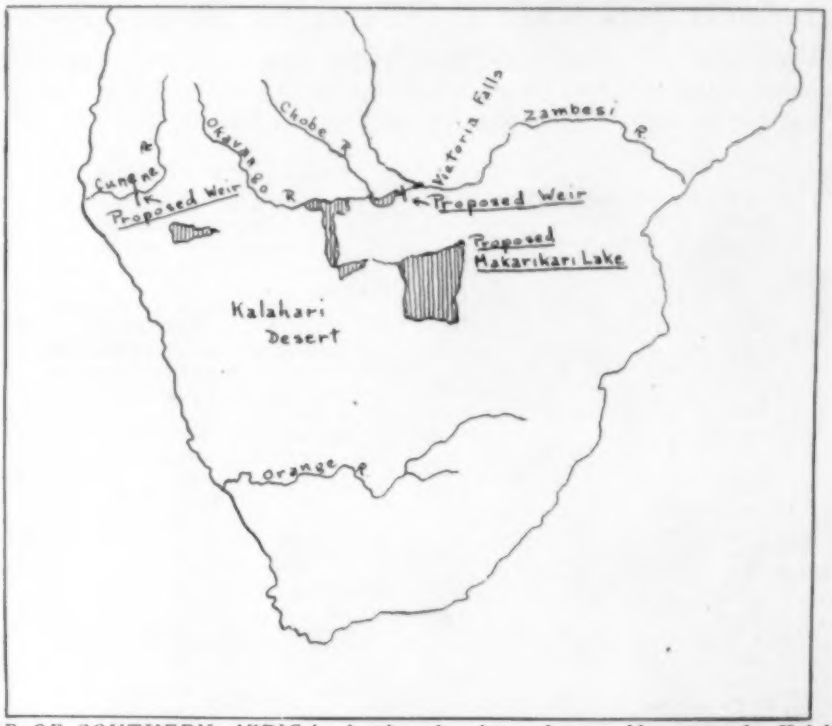
miles down these highways. When the boat trip ended unexpectedly in a dry field, the geologist and the natives managed to engage a wagon and set out through 250 miles of deep sand, the worst of the desert, the region known as the Great Thrist.

This remarkable desert exploration trip took place in 1925, the year of the great flood, but until now Professor Schwarz has been more absorbed in the scientific significance of what he saw than in telling the world about his adventures and discoveries. Ever since he began traveling through South Africa he has been troubled by the terrible results of drought, which is becoming more and more of a problem. Plan after plan to make the Kalahari region fertile again was worked out by him and rejected for one reason or another. The desert journey gave him many important facts to work with because it revealed to him the exact condition of the river courses in the old days and showed how the rivers would take their old channels if given a chance. Now, however, he has taken time off to tell the story of his explorations and his theories, explaining the relation of the Bushmen to the races of the world. These theories and discoveries will appear shortly in book form, he states.

The growing aridity of the Kalahari is starving out the Bushmen rapidly. A single thunder storm is enough to make dry sticks of trees bloom again and to send the grass shooting up luxuriantly, for the dryness of the Kalahari is not old enough to be entirely barren. But rains are becoming rare. Drought is the rule. In 1918, when Professor Schwarz went through the western edge of the Kalahari, the capital of Ovamboland was strewn with human skeletons, the remains of Ovambo natives who were seeking food and water and had fallen by the way. Fifteen thousand perished in this way.

The drying process of the rainless region is ruining 300,000 square miles of country for any useful purpose, but Professor Schwarz points out that comparatively inexpensive engineering works will restore the rivers to their former routes and save the water now carried off uselessly to the sea.

The chief rivers in question are the Zambesi, the Chobe and the Okavango. The Zambesi is an international waterway, and its use would involve international negotiations. But in




*MAP OF SOUTHERN AFRICA, showing the rivers that would restore the Kalahari Desert to fertility and the areas which would become reservoirs*

time of a great flood all of the water cannot flow over the Victoria Falls, but some is pushed into its old channels leading down through the Kalahari. Part of this excess flood water can be controlled during flood time by a sill on the Kalembesi River which flows into the Zambesi, and the water thus diverted would be turned into the great depression in the southern Kalahari known as the Makarikari. To send the water of the other rivers, the Chobe and the Ovango, into the Kalahari, the geologist proposes a weir at Ngoma, near Victoria Falls, for this obstruction would divert enough water to recreate the old desert streams. In the west of the Kalahari he proposes building a forty foot wall across the Cunene to turn the water into a stream heading for the Kalahari.

The scheme would make economical use of the materials of the region for the barrages. The Ngoma weir, for instance, would be made of Mopane wood, which is resistant to rot and which is available in quantities from nearby forests. The Mopane piles would be filled in with rubble from adjoining basalt hills. The wall would have to be as high as 20 feet for a short distance, the geologist estimates, and it would have to continue over the flats to the margin of forest never covered by any record floods. If the flood waters were stemmed at Ngoma, an accumulation of sand would form behind the wall, and reeds would grow in dense masses, thus adding ten more feet to the effective height of the wall.

The result of the engineering project would make the Kalahari a well-watered luxuriant region, as it formerly was, and would re-vitalize one-tenth of the whole arid region of South Africa.

"At present," the geologist says, "the Kalahari acts as a reverberatory furnace, whence blow the hot winds that devastate the land, producing the dreadful droughts in South Africa. If this area is converted into a verdant region, rain-laden clouds will blow off it, with corresponding beneficial effects to the surrounding country."

The project would save the remnant of the starved-out natives, it is argued. It would rid the white farmers of the surrounding country of the terrors of drought. And it would create land for settlement and farming.

The British government sent an official expedition into the Kalahari last summer to determine the value of such an undertaking, for it is realized that while there are many plans for making over Africa to suit its modern inhabitants, this project is one that involves very large economic consequences.

# Books of Foreign Lands

When sleet beats against the window, and winds whistle outdoors, what is better than a chair by the fire and a book to take you far away? Select one of the recent books listed below.

*EUROPE*

☐ *High Lights of Geography*—Europe, by David Starr Jordan. Yonkers-on-Hudson, 1925.....$1.44

☐ *The Spanish Pageant*, by Arthur Stanley Riggs. Indianapolis, 1928..... 5.00

☐ *The Stones of Italy*, written and illustrated by C. T. G. Formilli. London, 1927... 7.00 Beautifully illustrated in color.

☐ *The Turkish Ordeal*, by Halide Edib. New York, 1928. ..... 4.00

☐ *Understanding Spain*, by Clayton Sedgwick Cooper. New York, 1928..... 2.50

☐ *Dreiser Looks at Russia*, by Theodore Dreiser. New York, 1928..... 3.00

☐ *The Fall of the Russian Empire*, by Edmund A. Walsh. Boston, 1928..... 3.50

☐ *The New Russia*, by Dorothy Thompson. New York, 1928. ..... 3.00

☐ *Present-Day Russia*, by Ivy Lee. New York, 1928..... 2.50

☐ *Soviet Russia in the Second Decade*, A joint survey by the technical staff of the American Trade Union Delegation, Edited by Stuart Chase, Robert Dunn and R. G. Tugwell. New York, 1928..... 4.00

*AFRICA*

☐ *Africa*, a Geography Reader, by J. W. Gregory. New York, 1928. Interesting to the general reader; well illustrated. ..... 1.50

☐ *In Brightest Africa*, by Carl E. Akeley. Garden City, 1925. ..... 1.00

☐ *The Glamour of Near East Excavation*, by James Baikie. Philadelphia, ..... 5.00

☐ *The Nile and Egyptian Civilization*, by Alexandre Moret. New York, 1927.. 7.50

*GENERAL*

☐ *The Human Habitat*, by Ellsworth Huntington. New York, 1927..... 3.00

☐ *The New World*, Problems in Political Geography, by Isaiah Bowman. Yonkers-on-Hudson, 4th ed., 1928.. 6.00

☐ *A Shorter Physical Geography*, by Emmanuel de Martonne. New York, 1928. ..... 3.25

*AUSTRALIA AND ISLANDS*

☐ *Coo-ee Talks*, by W. Robertton. Sydney, 1928.....$3.75 Entertainingly written, about Australian natives.

☐ *Dragon Lizards of Komodo*, by W. Douglas Burden. New York, 1927..... 3.50

☐ *The Kiwai Papuans of British New Guinea*, by Gunnar Landtman. London, 1927. .....12.00

☐ *The Pacific*, A Forecast, by P. T. Etherton and H. H. Tiltman. Boston, 1928.... 3.00

☐ *The Philippines Today*, by Robert W. Hart. New York, 1928..... 2.50

*ARTIC REGIONS*

☐ *Across Arctic America*, by Knud Rasmussen. New York, 1927.....$5.00

☐ *The Cruise of the Northern Light*, Explorations and Hunting in the Alaskan and Siberian Arctic, by Mrs. John Borden. New York, 1928..... 4.50

☐ *David Goes to Baffin Land*, by David Binney Putnam. New York, 1927. A book by a boy, for boys—and older people, too..... 1.75

☐ *Etah and Beyond*, or Life Within Twelve Degrees of the Pole, by Donald Baxter MacMillan. Boston, 1927. ..... 5.00

☐ *First Crossing of the Polar Sea*, by Roald Amundsen and Lincoln Ellsworth. New York, 1927..... 5.00

☐ *The Krassin*, by Maurice Parijanine. New York, 1929. An account of the Russian expedition to rescue Nobile. ..... 2.50

☐ *The Polar Regions in the Twentieth Century*, by A. W. Greely. Boston, 1928. 4.00

*ASIA*

☐ *China*, a Nation in Evolution, by Paul Monroe. New York, 1928.....$3.50

☐ *Contemporaries of Marco Polo*, Edited by Manuel Komroff, New York, 1928. 3.50

☐ *A Short History of China*, by Edward Thomas Williams. New York, 1928..... 5.00

☐ *The Story of Everest*, by Captain John Noel. Boston, 1927. ..... 4.00

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# FIRST GLANCES AT NEW BOOKS

THE INFERIORITY FEELING—William S. Walsh—*Dutton* ($2.50). A simply written book that the average individual can understand, and which makes clear the far-reaching significance of mental and emotional experiences. The reader who has no serious inferiority problem of his own, may find enlightenment here for more successful dealing with children, relatives, students, employees, friends, and others, so that he may avoid thoughtlessly implanting such problems in the lives that he touches.

*Psychiatry*
*Science News-Letter, January 19, 1929*

STAMMERING, A PSYCHOANALYTIC INTERPRETATION—Isador H. Coriat—*Nervous and Mental Disease Pub. Co.* ($2). This psychoanalyst's view is that "stammering is not a speech defect, false articulation, failure of respiration or defective vocalization, but a psychoneurosis". The neurosis is an infantile reaction, narcissistic in character, he declares. Speech training in such cases is denounced as treating, not the neurosis, but only the symptom "and that inadequately and unscientifically".

*Psychoanalysis*
*Science News-Letter, February 16, 1929*

THE MINDS OF ANIMALS—J. Arthur Thomson—*Newnes* (2s). This most inimitable of all British writers on natural history here tackles the vexed questions of homing, animal obedience. the supposed "thinking" and counting abilities; and descends also into the depths for traces of mind in such things as amoebae, molluscs and echinoderms.

*Comparative Psychology*
*Science News-Letter, February 16, 1929*

THE STORY OF HUMAN PROGRESS—Leon C. Marshall—*Macmillan* ($3.50). A different sort of sociology and economics book. It goes back to savages making fire, to the ancestry of the alphabet, to the Phoenicians trading their cargoes with early Britons. The gaps between such ancient institutions and ours are skilfully bridged. Later on the author comes to discussing such matters as public opinion and cooperation in industry, but even here he keeps the reader or student aware of the continuity of civilization. The style is simple, and many pictures and graphic devices add to the clearness of the discussion.

*Economics—Sociology*
*Science News-Letter, February 16, 1929*

COO-EE TALKS—W. Robertson—*Angus & Robertson, Sydney* (12s. 6d.). Australian natives are as interesting a folk as you will find, and Mr. Robertson describes them with the understanding of a man who has played games with them as a child, hunted with their young men, and listened to their stories. Dr. Herbert Basedow, noted anthropologist, has edited the book.

*Ethnology*
*Science News-Letter, February 16, 1929*

FORTY-FIRST ANNUAL REPORT OF THE BUREAU OF AMERICAN ETHNOLOGY TO THE SECRETARY OF THE SMITHSONIAN INSTITUTION, 1919-1924. *Government Printing Office* ($2.50). Besides administrative reports there are comprehensive papers on "Coiled Basketry in British Columbia" by H. K. Haeberlin and others, and on "Two Prehistoric Villages in Middle Tennessee" by William Edward Myer.

*Ethnology*
*Science News-Letter, February 16, 1929*

THE PHYSICAL BASIS OF SOCIETY—Carl Kelsey—*Appelton* ($3.50). Man as a social being is examined against his complex background of a world revolutionized by applied science, under the light of what we have learned in the past generation or two about his heredity and have come to infer about his origin.

*Sociology*
*Science News-Letter, February 16, 1929*

THE KIWAI PAPUANS OF BRITISH NEW GUINEA—Gunnar Landtman—*Macmillan, London* ($12). The natives of British New Guinea are described by a scientist who lived among them for two years. Their curious customs, manners and superstitions will be of interest to any student of anthropology and sociology.

*Anthropology*
*Science News-Letter, February 16, 1929*

LETTERS FROM THE STEPPE, WRITTEN IN THE YEARS 1886-1887—William Bateson—*Methuen, London* (7s. 6d.). A vivid picture of the steppes of Russia and Siberia before the Siberian or Tashkend Railroads were built, presented in a series of letters from a biologist who went to study the fauna of ancient Asiatic seas.

*Anthropology*
*Science News-Letter, February 16, 1929*

THE BIOLOGY OF INSECTS—G. H. Carpenter—*Macmillan* ($6.50). The great majority of books on insects produced in this country fall into three general classes; they are either elementary textbooks, or popular field books, or handbooks of economic entomology. The lack of a book devoted avowedly to the anatomy and physiology of insects has been keenly felt, and American entomologists and biologists in general will be grateful to their British colleague for adding this thorough-going treatise to the literature.

*Entomology—Biology*
*Science News-Letter, February 16, 1929*

INSECTS—G. E. Hodson—*Webb* (72c). Entomological nature stories for children, done in the form of a running narrative of the good times "Mother and Ann" have outdoors. Refreshingly free from the "baby talk" that mars some nature books. Such seem to be written by persons who call children "kiddies"; the present author, fortunately, evidently realizes that children are intelligent human beings and entitled to treatment as such.

*Entomology*
*Science News-Letter, February 16, 1929*

PRACTICAL BEE-BREEDING—A. Gilman—*Putnam's* ($2.50). In this book the accepted methods for producing better bees are set forth in simple, direct, and not-too-technical language. The illustrations are all clean-cut line drawings and diagrams. He who runs an apiary may read this book with profit.

*Entomology*
*Science News-Letter, February 16, 1929*

PROBLEMS OF INSTINCT AND INTELLIGENCE—R. W. G. Hingston—*Macmillan* ($3.25). Herein a widely traveled British naturalist tells of watching insect performances that seem almost superhuman in their intelligence, only to be demonstrated as almost idiotic in their inflexible persistence after they have been rendered purposeless by the experimenter. Then he brings in fresh observations that again build up one's awe of insect intelligence. The book does not give a final answer to the riddle of instinct, but it certainly throws fresh light on some of its difficult spots.

*Entomology—Comparative Psychology*
*Science News-Letter, February 16, 1929*

# First Glances at New Books—*Continued*

THE HEART OF BURROUGHS'S JOURNALS—Edited by Clara Barrus—*Houghton Mifflin* ($3). The art of writing journals, it is to be feared, is passing. It belonged to an earlier age, when at least naturalists and philosophers had leisure. Fortunately for us, John Burroughs also belonged to that age, and filled many books with his daily jottings. The present editor has made a good selection from these, preserving a sense of unity in spite of the intense telescoping made necessary by the size limits imposed.

*Biography*
*Science News-Letter, February 16, 1929*

THE LAKE OF THE SKY: LAKE TAHOE—George Wharton James and Edith E. Farnsworth—*Page* ($5). Lake Tahoe, away up on the roof of the Sierras, is a place of fabulous beauty, increasingly appreciated by the American touring public. In this book its scenic, historic and natural history aspects are attractively presented, together with sections giving useful hints to travelers.

*Natural History*
*Science News-Letter, February 16, 1929*

LIFE IN INLAND WATERS—Kathleen E. Carpenter—*Macmillan* ($4.50). Although written for a British audience, about British aquatic creatures, this book can find considerable place on this side of the ocean, among those who literally "look beneath the surface" when they are walking by springtime ponds and brooks.

*Biology*
*Science News-Letter, February 16, 1929*

THE SEAS—F. S. Russell and C. M. Yonge—*Warne* ($5). A general account of marine biology, by two competent British authors, illustrated with many halftones and a number of good color plates.

*Marine Biology*
*Science News-Letter, February 16, 1929*

THE FROG—A. M. Marshall—*Macmillan* ($2). A compact but complete account of the anatomy, histology and embryology of this much-dissected animal, designed for laboratory use.

*Zoology*
*Science News-Letter, February 16, 1929*

A LABORATORY MANUAL FOR COMPARATIVE ANATOMY—M. E. Little and R. T. Kempton—*Macmillan* ($2.25). A second edition of a widely used and successful work.

*Zoology*
*Science News-Letter, February 16, 1929*

FREEDOM OF THE SEAS—J. M. Kenworthy and George Young—*Horace Liveright* ($4). The authors conclude that freedom of the seas can come only through drastic reduction of naval armament. It is an outline of the "unseen revolution in sea power" which, the book declares, must come from the increasingly extravagant navies of today.

*Politics*
*Science News-Letter, February 16, 1929*

AFRICA, A GEOGRAPHY READER—J. W. Gregory—*Rand McNally* ($1.50). A compact little book of 456 pages, which really arouses interest in Africa. It is designed for students, but is attractive to the general reader. Profusely illustrated in half tones, and well indexed.

*Geography*
*Science News-Letter, February 16, 1929*

CORN FROM EGYPT—M. Gompertz—*Morrow* ($1). Another little volume of the series on "The Beginning of Things". This is a readable account of how ancient civilizations met their farm problems, including introduction of new food plants, timing of crops, farm equipment and irrigation; also how agriculture forced changes and brought progress.

*Agriculture—Ethnology*
*Science News-Letter, February 16, 1929*

TARIFF PROBLEMS OF THE UNITED STATES—Edited by Harry T. Collins—*American Academy of Political and Social Science* ($2). Although the January, 1929, issue of the annals of the publishing organization, this volume is worthy of being treated as a book. Practically all the aspects of the tariff are reviewed by many authorities.

*Economics*
*Science News-Letter, February 16, 1929*

AN EVOLUTIONIST LOOKS AT RELIGION—Charles A. Collin—*Stratford* ($2.50). The author finds in the Bible a progressive revelation and hence argues that religion is part of an evolutionary world scheme. He regards God as a "Continuous Cause" rather than an "Absolute First Cause." Religion, Philosophy and Science are three co-ordinates necessary for an adequate interpretation of the world we live in. The author believes that "the Relativity Theories are self-destructive."

*Evolution*
*Science News-Letter, February 16, 1929*

AN ANNOTATED BIBLIOGRATHY OF MODERN LANGUAGE METHODOLOGY—M. A. Buchanan and E. D. MacPhee *Toronto, The University Press* ($1). An invaluable aid to those interested in language teaching. A well annotated and well indexed bibliography of 340 pages, arranged under the following heads: Works of Reference, Histories, Aims and Process, Tests and Examinations, Texts Used Abroad, Miscellaneous.

*Language*
*Science News-Letter, February 16, 1929*

TAKING THE DOCTOR'S PULSE—J. F. Montague—*Lippincott* ($1). Two short essays, one on the status of medicine and the other on the possibilities of "medical movies", and reviews of another of the author's books comprise this slim volume.

*Popular Medicine*
*Science News-Letter, February 16, 1929*

THE TECHNIC OF ORAL RADIOGRAPHY—Clarence O. Simpson—*Mosby* ($5). This is the second edition of a textbook or manual for dentists, roentgologists and students. The need for such a book has long existed. Some changes and additions have been made in this edition to make the book more up to date and more lucid.

*Dentistry—Roentgenology*
*Science News-Letter, February 16, 1929*

LAND DRAINAGE AND RECLAMATION—Q. C. Ayres and D. Scoates—*McGraw-Hill* ($4). This is a book for the practical drainage engineer, and for the man who owns a swamp or shallow lake he wants to turn into farm land or profitable forest.

*Engineering*
*Science News-Letter, February 16, 1929*

A SYNTHESIS AND EVOLUTION OF SUBJECT-MATTER TOPICS IN GENERAL SCIENCE—F. D. Curtis—*Ginn* ($1). An attempt to arrive at a quantitative valuation of the various elements used or proposed for courses in general science. Of value to educational administrators.

*Education*
*Science News-Letter, February 16, 1929*

THE TRUTH ABOUT SNAKE STORIES—K. P. Schmidt—*Field Museum* (20c). A valuable little pamphlet, scientifically "de-bunking" many myths and superstitions about snakes.

*Herpetology*
*Science News-Letter, February 16, 1929*

# Earth May Move When Moon Beckons

*Astronomy*

The axis of the earth may shift a little each day as the moon rises in the east, crosses the sky, and sets in the west. This may be the cause of a daily change in the latitude of a place on the earth that has just been discovered by Dr. Harlan T. Stetson, director of the Astronomical Laboratory at Harvard University, Cambridge. He was assisted in his work by Miss Margaret Olmsted, a graduate student at Radcliffe College.

What they discovered is a variation in latitude of any point on the earth's surface, dependent upon whether the moon is rising, setting, or in the middle of its passage across the sky. The variation is nearly ten times as great as any that can be explained on theoretical grounds.

"A slow progressive shift of the axis about which the earth rotates over a period of months and years has been known for a long time," explained Professor Stetson, "but that there shall exist a daily effect depending upon the position of the moon in the sky was not known until the results of the present investigation were found. From the results of other investigations in progress at the Astronomical Laboratory we were led to believe that the moon might cause a deviation in the direction of gravity as it passed over the meridian of the observer.

"The most delicate test for a change in the direction of the vertical is to be found in the precise observations of stars for latitude. A photographic zenith telescope locates the position of the zenith with respect to the stars with the order of accuracy of about a hundredth of a second of arc, which corresponds to a foot on the earth's surface. The investigation was begun last spring of several thousands of such observations for latitude made some time ago at Gaithersburg, Md., one of the stations of the International Latitude Survey. It was the recent analysis of this series of observations that brought to light the variation of nearly a tenth of a second of arc in latitude, depending upon the altitude of the moon. The maximum value occurs when the moon is 30 degrees about the horizon."

Thousands of observations for latitude of the Naval Observatory at Washington have been analyzed at the Harvard Laboratory and Professor Stetson announces these appear unmistakably to affirm the results of his previous study. The fact that this rise and fall of the value in latitude is gradual and systematic and represents a range nearly twenty times the value of the probable error leaves little room for doubt as to the reality of the variatiion. Several hypotheses are being considered to explain the phenomena which may be due to a combination of causes.

"Theoretically," says Professor Stetson, "a small tide must take place on the earth's crust as the moon revolves about the earth. But from other considerations we do not think that this can be (*Turn to next page*)

## Was Disease Ruin of Maya?

*Archaeology—Medicine*

Whether disease or war or famine primarily caused the downfall of the great Maya empire has never been satisfactorily determined. Now an expedition of doctors and public health experts is setting out for Chichen Itza, famous capital city of this old American civilization, to find out, if possible, whether it was disease that ruined it and if so, what diseases in particular.

The expedition is from the department of tropical medicine of the Harvard Medical School and School of Public Health and the Carnegie Foundation of Washington. It is in charge of Dr. George C. Shattuck and includes Dr. Joseph C. Bequaert, entomologist, Dr. Jack H. Sandground, parasitologist; Dr. Kenneth Goodner, bacteriologist, and Byron L. Bennett, laboratory technician.

Nothing is now left of beautiful Chichen Itza but ruins. However, in some of the neighboring villages the population consists of practically pure-blooded Maya Indians. A study of the diseases that afflict these people now may throw light on the diseases that their ancestors suffered from. Such is the object and hope of the present expedition.

The case for disease as the destroyer of this famous old civilization, which collapsed (*Turn to next page*)

## Astronomers on Way to Eclipse

*Astronomy*

Two groups of American astronomers are now on their way to Malaysia to observe the eclipse of May 9. Dr. John A. Miller and Mrs. Miller, from the Sproul Observatory of Swarthmore College, and Dr. Heber D. Curtis, of the Allegheny Observatory of the University of Pittsburgh, sailed from Genoa February 8 on a Dutch steamer, the *P. C. Hooft*, for Sumatra. Arriving at Belawan on February 27, they will spend a few days in Medan, the capital on the east coast, and then proceed by motor truck to Takengeun, about 300 miles away in the mountains. There they will set up their large telescope and other equipment for the observations of the brief moments of the eclipse.

The other party is now sailing westward across the Pacific on the naval transport Chaumont. This is the expedition from the U. S. Naval Observatory, under the administrative charge of Commander C. H. J. Keppler, U. S. N. Prof. William A. Cogshall, of the University of Indiana, is the scientific leader of the party. With him is Mrs. Cogshall, also an experienced eclipse observer, and Paul Sollenberger, astronomer of the Naval Observatory. Lieut. H. C. Kellers, of the Navy Medical Corps, is with the party in the dual capacity of staff physician and also as a representative of the U. S. National Museum, for whom he will collect specimens of the flora and fauna of the countries visited.

The Naval Observatory party will set up its instruments at Iloilo, on the Island of Panay, with the cooperation of the Manila Observatory. Admiral Bristol, commander-in-chief of the Asiatic fleet, will furnish the expedition with the services of an expert motion-picture cameraman and the necessary mechanics and helpers.

This year's eclipse, which takes place during the afternoon of May ninth, is of exceptional importance on account of its long duration, the maximum duration of totality being over five minutes. Although wholly invisible in the United States, in fact, taking place in the dark hours of the eighth of May, the eclipse stretches its beam of darkness over widely separated land areas from the northwestern end of Sumatra, across the Malay State of Kedah, across Siam and Southern Cambodia, and finally over the middle group of islands of the Philippines between Luzon to the north and Mindanao to the south, including the im- (*Turn to next page*)

## Moon Moves Earth—*Cont.*

sufficiiently large to account for the observed effect. A tidal wave in the earth's atmosphere caused by the moon may alter the apparent direction of the ray of light from a star and produce some of the effect noted. The most direct interpretation is that of a shift in the earth's instantaneous axis of rotations. As a last resort it may be necessary to consider movement in the earth's crust.

"The importance, however, of the discovered effect need hardly be emphasized, as it is involved in the accurate determination of star positions from the minute changes of which much of the knowledge of our stellar motions depends. If the change in latitude here noted becomes substantiated by further researches it may appear necessary to apply new corrections to astronomical observation not hitherto recognized. Well-known discrepancies between the recults for the positions of stars from widely separated observatories may yet be explained in part at least by this phenomenon."

*Science News-Letter, February 16, 1929*

## Metaphrenia

*Psychiatry*

A. STAERCKE in *International Journal Psycho-Analysis,* quoted in *Emergent Evolution and the Development of Societies (Norton)*:

Civilization seems then to be a disease which is imposed on a certain portion of society in order to obtain a certain extra gain whereby all profit. . . Civilization from the individual point of view belongs to neurotic phenomena. . . . We see the civilization of a people or a race built up in cycles according to the mechanisms of the obsessional neurosis, until it becomes no longer bearable; then there comes about a limitation of the useful effect through the return of the repressed material in disguised form, and a breaking through of forbidden things in war and revolution, according to the principles of the manic psychoses, while various "isms" analogous to the paranoid fields are not lacking. . . . Civilization demands regression.

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## Snakebite Cures

*Herpetology*

KARL P. SCHMIDT, in *The Truth About Snake Stories (Field Museum).*

In North America the sovereign remedy for snake bite is whisky, prescribed in large doses. A more extraordinarily wrong procedure could not well be devised. Thorough-going experiments have shown that alcohol in small doses *increases* the rapidity with which snake poison is absorbed by the body, while in larger doses it very rapidly becomes an active aid to the snake poisoning, weakening the heart action when it most requires stimulation. . . .

The application of scientific research, beginning with the work of Pasteur, has developed the only real specifics against snake poison in the modern anti-venins. By their use, for example, the fatalities from snake poisoning in the Brazilian State of Sao Paulo have been reduced from the record of 155 in 1907 to two or three in 1924. Unfortunately it has been found that specific anti-venims must be prepared for each species, at least for each group of related species, of poisonous snakes; and this increases vastly the difficulties of treatment by this means. A North American anti-snake-bite serum has just been put on the market.

*Science News-Letter, February 16, 1929*

## Astronomers on Way to Eclipse—*Continued*

portant cities of Iloilo, the second in size in the Philippines, and Cebu, where Magellan met his death in his round-the-world cruise.

"The Observatory's expedition", said Capt. C. S. Freeman, superintendent of the Naval Observatory. "in addition to special observations on its own part, is duplicating certain features of the program arranged for the party from the Sproul Observatory of Swarthmore College, which will go to Sumatra. An interesting comparison of data is in prospect if both parties are favored with clear weather. Several other expeditions are to cover the many phases of this exceptional eclipse. British expeditions from Greenwich and Cambridge are in prospect. Four German expeditions are planned, one from Hamburg possibly operating in the Philippines. Then there are Dutch, French, and Italian expeditions in preparation, and possibly one from Australia.

"The corona effects of this eclipse will not repeat themselves for another quarter of a century. It is therefore the corona that will receive intensive study this year. Besides a study of the Einstein problem, the various programs contemplate spectrophotometry of the chromosphere and corona both in the red and in the ultra-violet, a study of solar radiation near and through totality, experiments to test the effect of totality on radio transmission, relative intensities of the lines of the coronal spectrum, improved measurement of the wavelengths for the coronal lines with a spectograph of high dispersion, examination for displacement of the dark lines of the outer corona with a slit spectroscope of high dispersion, a study of coronal rotation with a falling plate spectrograph and an interferometer and with a quartz spectrograph, and other features, including a special study of the shadow-band phenomenon."

*Science News-Letter, February 9, 1929*

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The German government has invited teachers from Argentine to inspect the schools of Germany.

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About 75,000 new patients are admitted to hospitals for mental diseases in this country each year.

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A queer cargo recently shipped from New York City was 50 tons of live eels to be used in re-stocking the Baltic Sea.

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A Field Museum expedition will explore remote regions of Brazil and Peru in search of new and rare plant specimens.

## Maya Disease—*Cont'd*

about the time of the Spanish conquest, is particularly good when one considers what a hotbed of disease Middle America has been, so far as our knowledge of it goes. The various fevers carried by parasites and insects may or may not have existed before the white man came to America. Of course, if they did, the Indians probably had acquired an immunity to them, in which case the downfall of the Mayas probably resulted from wars with other tribes.

Yellow fever and syphilis are now generally accepted as being of strictly American origin. On the other hand, smallpox, measles, malaria, hookworm, Asiatic cholera and trachoma, all of which have been very deadly for the red man, were introduced by the white man.

Whatever the cause, it is generally conceded that the Mayas were already greatly weakened before the Spaniards arrived. This accounts for their rapid downfall, the Spanish conquest.

*Science News-Letter, February 16, 1929*

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Between 1873 and May, 1928, there were 50 attempts to cross the Atlantic and Pacific Oceans by air.

# CLASSICS OF SCIENCE:

## Chromosomes in Heredity

*Biology*

**A pioneer in the study of heredity, Weismann was among the first to recognize that inheritance is carried, not by the whole reproductive cells, nor even their nuclei, but by the still more minute chromosomes within the nucleus.**

### *Fusion of Cells*

*THE GERM-PLASM, A Theory of Heredity, by August Weismann (1892). Translated by W. Newton Parker, Ph. D., and Harriet Rönnfeldt B. Sc., New York, 1892.*

As long as we were under the erroneous impression that the fertilisation of the ovum by the spermatozoon depended on an *aura seminalis* which incited the egg to undergo development, we could only partially explain the fact that the father as well as the mother is able to transmit characters to the children by assuming the existence of a *spiritus rector*, contained in the *aura seminalis* which was transferred to the ovum and united with that of the latter, and thus with it directed the development. The discovery that development is effected by material particles of the substance of the sperm, the sperm-cells, entering the ovum, opened the way to a more correct interpretation of this process. We now know that fertilisation is nothing more than the partial or complete fusion of two cells, the sperm-cell and the egg-cell, and that normally only *one* of the former unites with *one* of the latter. Fertilisation thus depends on the union of two protoplasmic substances. Moreover, although the male germ-cell is always very much smaller relatively than the female germ-cell, we know that the father's capacity for transmission is as great as the mother's. The important conclusion is therefore arrived at that only a small portion of the substance of the ovum can be the actual hereditary substance. . . . From his observations on the egg of the starfish, Oscar Hertwig had suspected that the essential part of the process of fertilisation consists in the union of the *nuclei* of the egg- and sperm-cells, and as it is now known that the hereditary substance is undoubtedly contained in the nucleus, this view has, in this respect at least, proved to be the right one. It is true that the nucleus of the male cell is always surrounded by a cell-body, and that Strasburger's opinion to the contrary is incorrect. We now know, through the researches of Guignard, that even in Phanerogams a small cell-body surrounds the nucleus, and that a special structure, the "centrosome",—which is absolutely essential for the commencement of development,—is contained within it. This structure will be treated of in further detail presently, but I must here lay stress upon my view, that *the "centrosome" with its "sphere of attraction" cannot in any case be the hereditary substance*, and that *it is merely an apparatus for the division of the cell and nucleus.*

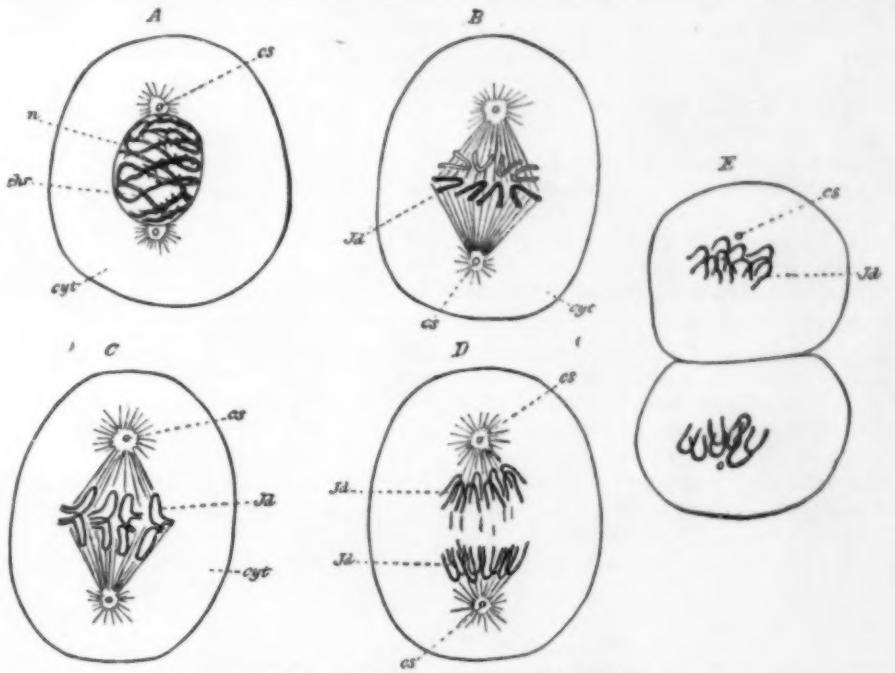


*DIAGRAM OF NUCLEAR DIVISION*

*A.—Cell with nucleus—n, and centrosomes—cs, preparatory to division. The chromatin has become thickened so as to form a spiral thread—chr.*

*B.—The nuclear membrane has disappeared. Delicate threads radiate from the centrosomes, and form the "nuclear spindle," in the equator of which eight chromosomes or nuclear loops (chr) are arranged: these have been formed by the spiral thread of chromatin in A becoming broken up.*

*C.—The chromosomes have each become split longitudinally into two, and are about to be drawn apart by means of the spindle-threads. (For the sake of clearness only four of the eight chromosomes are indicated.)*

*D.—The daughter-loops pass towards the poles of the spindle.*

*E.—The body of the cell has undergone division; each of the resultant cells contains a centrosome and eight nuclear loops.*

Both in animals and plants, however, essentially the same substance is contained in the nucleus both of the sperm-cell and egg-cell:—this is the *hereditary substance of the species.* There can now be no longer any doubt that the view which has been held for years by Strasburger and myself is the correct one, according to which *the nuclei of the male and those of the female germ-cells are essentially similar, i. e.*, in any given species *they contain the same specific hereditary substance.*

The splendid and important investigations carried out by Auerbach, Bütschli, Flemming, and many others, on the detailed processes of nuclear division in general, and those dealing more particularly with the fertilisation of the egg in *Ascaris* by van Beneden, Boveri, and others, have given us the means of ascertaining more definitely what portion of the nucleus is the substance on which heredity depends. As already remarked, this substance corresponds to the "chromosomes", those rod-like, looped, or granular bodies which are contained in the nucleus, and which become deeply stained by colouring matters.

As soon as it had been undoubtedly proved that the nucleus, and not the body of the cell, must contain the hereditary substance, the conclusion was drawn that neither the membrane of the nucleus, nor its fluid contents, nor the nucleoli—which latter had been the first to attract attention—could be regarded as such, and that the "chromatic granules" alone were important in this respect. As a matter of fact (*Turn to next page*)

## Chromosomes—*Continued*

several investigators—Strasburger, Oscar Hertwig, Köllicker, and myself—reasoning from the same data, arrived at this conclusion, independently, within a short time of one another.

It will not be considered uninteresting or superfluous to recapitulate the weighty reasons which force us to this conclusion, for it is clear that it must be of fundamental importance in a theory of heredity to know for certain what the substance is from which the phenomena which are to be explained proceed.

### *The Chromosomes*

The certainty with which we can claim the "chromatin granules" of the nucleus as the hereditary substance depends firstly, on the process of amphimixis; and secondly, on that of nuclear division. We know that the process of fertilisation consists essentially in the association of an equal number of chromatin rods from the paternal and maternal germ-cells, and that these give rise to a new nucleus from which the formation of the offspring proceeds. We also know that in order to become capable of fertilisation each germ-cell must first get rid of half of its nuclear rods, a process which is accomplished by very peculiar divisions. Without entering into further particulars here, amphimixis may be described as a process by means of which one-half of the number of nuclear rods is removed from a cell and replaced by an equal number from another germ-cell.

The manner, however, in which the chromatin substance is divided in nuclear division strengthens the above view of its fundamental nature. This method of division leaves no doubt that it is a substance of the utmost importance. I need only briefly recapitulate the main points of the wonderfully complicated process of the so-called mitotic or karyokinetic cell-division, which follows a definite law even as regards the most minute details.

When the nucleus is going to divide, the chromatin granules, which till then were scattered, become arranged in a row, and form a long thread, which extends through the nucleus in an irregular spiral, and then divides into portions (*chromosomes*) of fairly equal length. The chromosomes have at first the form of long bands or loops, but afterwards become shortened, thus giving rise to short loops, or else to straight rods or rounded granules. With certain exceptions, to be mentioned later, the number of chromosomes which arise in this way is constant for each species of plant or animal, and also for successive series of cells. By the time the process has reached this stage a special mechanism appears, which has till now remained concealed in the cell substance. This serves to divide the chromatin elements into two equal parts, to separate the resulting halves from one another, and to arrange them in a regular manner. At the opposite poles of the longitudinal axis of the nucleus two clear bodies—the "centrosomes", each surrounded by a clear zone, the so-called "sphere of attraction"—now become visible. The importance of these was first recognised by Fol, van Beneden, and Boveri. They possess a great power of attraction over the vital particles of the cell, so that these become arranged around them like a series of rays. At a certain stage in the preparation for division, the soft protoplasmic substance of the cell-body as well as of the nucleus give rise to delicate fibres or threads: these fibres are motile, and, after the disappearance of the nuclear membrane, seize the chromosomes—whether these have the form of loops, rods, or globular bodies—with wonderful certainty and regularity, and in such a way that each element is held on either side by several threads from either pole. The chromatin elements thus immediately become arranged in a fixed and regular manner, so that they all come to lie in the equatorial plane of the nucleus, which we may consider as a spherical body. The chromatin elements then split longitudinally, and thus become doubled, as Flemming first pointed out. It must be mentioned that this splitting it not caused by a pull from the pole threads (spindle threads), which attach themselves to the chromatin rods on both sides; the division arises rather from forces acting in the rods themselves, as is proved by the fact that they are often ready to divide, or indeed have already done so, some time before their equatorial arrangement has taken place by means of these threads.

The splitting is completed by the two halves being gradually drawn further apart towards the opposite poles of the nuclear spindle, until they finally approach the center of attraction or centrosome, which has now fulfilled its object for the present, and retires into the obscurity of the cell-substance, only to become active again at the next cell-division. Each separated half of the nucleus now constitutes a daughter-nucleus, in which it immediately breaks up, and becomes scatered in the form of minute granules in the delicate nuclear network, so that finally a nucleus is formed of exactly the same structure as that with which we started. Similar stages to those which occur in the aggregation of the chromatin substance in the mother-nucleus preparatory to division are passed through during the separation of the daughter-nuclei, but in the reverse order.

It is evident, as Wilhelm Roux was the first to point out, that the whole complex but wonderfully exact apparatus for the division of the nucleus exists for the purpose of dividing the chromatin substance in a fixed and regular manner, not merely quantitatively, but also in respect of the *different qualities* which must be contained in it. So complicated an apparatus would have been unnecessary for the quantitative division only; if, however, the chromatin substance is not uniform, but is made up of several or many different qualities, each of which has to be divided as nearly as possible into halves, or according to some definite rule, a better apparatus could not be devised for the purpose. On the strength of this argument, we may therefore represent *the hereditary substance as consisting of different "qualities."* The same conclusion is arrived at on purely theoretical grounds, as will be shown later on when we follow out the consequences of the process of amphimixis.

For the present it is sufficient to show that the complex mechanism for cell-division exists practically for the sole purpose of dividing the chromatin, and that thus the latter is without doubt the most important portion of the nucleus. Since, therefore, the hereditary substance is contained within the nucleus, *the chromati must be the hereditary substance.*

**August Weismann** was born January 17, 1834, at Frankfort-am-Main, and died November 6, 1914, at Freiburg. After graduating in medicine from Göttingen and spending several years in travel, in the German manner, he went to Freiburg to teach zoology when he was 32 and remained there for the rest of his 80 years. Study of variability in animals led to investigation of the mechanism of heredity, and to the germ-plasm theory. Although no longer held as he fabricated it, this theory was a step toward understanding the transmission of characteristics from one generation to the next.

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